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SALVIA COCCINEA, AN ORNITHOPHILOUS PLANT.

RICHARD C. MCGREGOR.

SOME time ago my attention was called to an Anna's Humming Bird (*Calypte anna*) visiting the flowers of a small garden shrub. Feathers at the base of the upper mandible were thickly covered with a yellow substance, undoubtedly pollen; something which I had not previously noticed in the hummers. The question was at once suggested, Does this plant depend upon birds for cross fertilization?

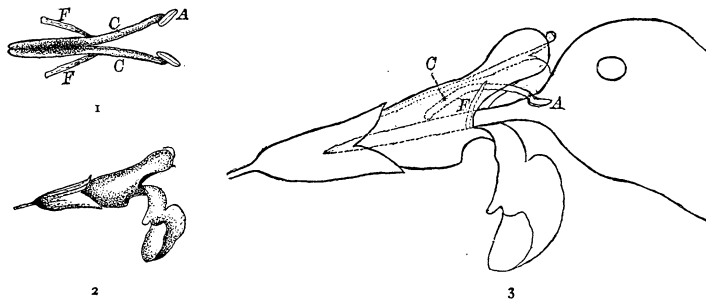
An examination of blossoms showed them to have the following described structure. The green striated calyx and scarlet labiate corolla are not striking. The pistil is bifurcate, the points protruding from the upper corolla lobe. The upper point is greatly recurved, the other slightly curved forward and downward. The stamens, two in number, are of an odd form, well known, however, to those familiar with this genus.

Their filaments are adherent to the corolla to within a short distance of its mouth, where they become free and run obliquely upward and forward, terminating on either side, close beneath the base of the upper lip. The connective is prolonged in each stamen into a slender longitudinally placed rod. Each connective is attached at its middle by a hinge joint to the end of its filament, thus forming an oblique lever with equal arms. The connectives are united for half their length. The anther-bearing ends are free, forming a Y-shaped affair with the arms close together (Fig. 3).

Experiments with a hummer skin and a salvia blossom demonstrate the method of fertilization. The posterior end of the lever is raised by the bird's bill, lowering the divided, anther-bearing end, one branch of which brushes each side of the bird's head, leaving its pollen among the feathers (Fig. 2). The sharp-pointed lower fork of the pistil in turn removes some of the pollen as the bird withdraws its bill. This may

come from its own anthers, or the anthers of another blossom. In dozens of flowers examined the pistil held pollen grains on its recurved tip.

It seems quite improbable that any of the bees or butterflies could force an entrance to this flower, while its scarlet color indicates that it does not bid for help from the night flying Lepidoptera. Several blossoms were found in which there was a small puncture at the base of corolla tube. These were at first attributed to bees, but as I later found a lepidopterous



Salvia Coccinea Linn.

1. Blossoms, $\frac{2}{3}$ natural size. 2. Enlarged optical section, showing connectives raised by birds' bill and pollen being deposited on the feathers. 3. Free ends of filaments, connectives and anthers; enlarged. A, anthers; C, connectives; F, free portion of filaments.

larva in the act of making one of these holes, I now doubt if the bees use the trick with this salvia.

In the humming birds we have an agent fitted at once for tripping the stamen lever and carrying a load of pollen. Anna's Hummer has a bill .68 inch long, while a smaller species found here, *Selasphorus rufus*, has an exposed culmen .64 inch in length. These easily reach the bottom of the salvia corolla tube, which is .52 inch from base to mouth.

Dr. William Trelease has described a similar fertilization of *Salvia splendens* Sellow by the Ruby-throated Hummer (*Trochilus colubris*), *American Naturalist*, April, 1881. Dr. Trelease thus describes the life of an individual blossom:

"The life of a given flower may be divided into three periods: in the first, the anthers only being mature, it is staminate in function; in the second, some pollen remaining in the anthers,

while the stigmas become receptive, it is functionally hermaphrodite or perfect; and in the third, the pollen having been entirely removed, while the stigma, if unfertilized, retains its freshness, it is pistillate only so far as function is concerned" (*loc. cit.*, p. 266).

Professor W. C. Dudley kindly identified the present species for me as *Salvia coccinea* Linn.